this reason, as both TRW and Constellation proposed in their comments, Motorola alone must accommodate in its spectrum assignment any guard band that is necessary between CDMA and FDMA/TDMA segments of the 1610-1626.5 MHz band. See TRW Comments at 75 & n.117; Constellation Comments at 28.

To the extent that Motorola suggests that out-of-band emission limits (which would act as surrogates for an intersystem guard band) should be imposed on both CDMA and FDMA/TDMA uplinks in order to protect Motorola's MSS uplinks, TRW opposes this suggestion as well. After all, protection between band segments is made necessary only because Motorola -- alone of all the applicants -- seeks to operate in the FDMA/TDMA mode. As noted, it appears that the real purpose of the Motorola proposal is not to protect its uplinks, but to protect its secondary downlinks.

In the attached Technical Appendix, TRW explains that Motorola's call for limits on CDMA MSS uplink operations -- a primary use of the allocation at 1610-1626.5 MHz -- is designed to compensate for the extraordinary sensitivity to

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96/(...continued)

Technical Appendix at 7), the Commission must reject this suggestion for the transparent ruse it most assuredly is. Motorola has not applied for or otherwise even shown a prior interest in the use of this allocation, the Commission has neither assigned nor formally been asked to assign a direction indicator to the spectrum in the United States, and Motorola has not demonstrated either a willingness or an ability to comply with the very strict operating conditions that attend AMSS(R) in this country. See Amendment of Parts 2, 22, and 25 of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Mobile Satellite Service for the Provision of Various Common Carrier Services, 4 FCC Rcd 6016, 6020-21 (1989). Motorola's discussion of the AMSS(R) allocation is nothing more than a straw man.

interference of Motorola's secondary MSS downlinks. Although TRW will not accept any constraints on its primary use to protect a secondary use, it is shown in the Technical Appendix that even under Motorola's own figures, there is no need for additional out-of-band filtering of Odyssey emissions in the 1610-1621.35 MHz band segment in order to protect Iridium uplinks.[97/]

There are enough constraints already, particularly on the frequencies to be used by CDMA systems. The Commission must, in short, reject Motorola's suggested revision to Proposed Section 25.202(f) and its suggested additions of Proposed Sections 25.202(g) and (h).

III. INTERSERVICE SHARING

A. RADIO ASTRONOMY SERVICE

All commenters addressing the matter of spectrum sharing between the MSS Above 1 GHz and the RAS support the broad outlines of the Commission's proposal to protect RAS sites from unacceptable interference.[98/] Given the

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97/ See Attachment A hereto, TRW Technical Appendix at A-16 to A-21.

98/ See, e.g., Constellation Comments at 46; Motorola Comments at 54-55; Comments of the Committee on Radio Frequencies of the National Academy of Sciences ("CORF Comments") at 1; Comments of Cornell University and the Arecibo Observatory ("Cornell Comments") at 3; TRW Comments at 115-121.

difficulty experienced by the MSS Above 1 GHz Negotiated Rulemaking Committee (the "Committee") in reaching the agreements which the Commission's proposed rules embrace and follow, TRW urges the Commission to dismiss the present attempts of various parties to obtain additional concessions for themselves beyond what the Committee recommended following open and objective deliberation.

1. The Commission Must Not Allow The RAS Community Arbitrarily To Expand Its Co-Primary Allocation.

While TRW acknowledges the need for protection of RAS sites against both unacceptable in-band and out-of-band interference, as emphasized by CORF and Cornell, TRW cannot accept either CORF's proposal for a new Section 25.213(a)(1)(iii) or its suggested changes to the Commission's Proposed Section 25.213(a)(1)(v).[99/] In its proposal for a new Section 25.213(a)(1)(iii), CORF offers two alternatives for the protection of RAS sites from out-of-band interference from MSS Above 1 GHz service mobile earth stations ("MES"). The first mentioned would require MSS operators to ensure that the PFD reaching RAS sites from an MES "operating anywhere" in the 1610-1626.5 MHz band would "not exceed the PFD from an MES operating within the 1610.6-1613.8 MHz band at the edge of the protection zone applicable for that site."[100/] CORF suggests that "[o]perators can achieve

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99/ See CORF Comments at 6.

100/ Id. at 4 (emphasis added).

this limit by taking into account the actual e.i.r.p., filter characteristics, and distance from the observatory of an MES requesting a frequency assignment."[101/] The second alternative in CORF's proposed rule would prohibit the operation of all MES in the 1613.8-1615.8 MHz band during RAS observations within protection zones of a 100 km radius around RAS sites identified in Section 25.213(a)(i), and a 30 km radius around RAS sites identified in Section 25.213(a)(ii).[102/] In addition, CORF proposes to modify the Commission's proposed Section 25.213(a)(1)(v) to require that MSS operators be capable of preventing MES operations in the 1610.6-1615.8 MHz bands within any defined RAS fixed protection zone.[103/]

It appears that the RAS community, as represented by CORF, is not only backing away from the agreements it helped achieve as a member of the Committee, but is also seeking greater protection from MSS operations in the 1610.6-1613.8 MHz band than that to which it is entitled as a co-primary service. TRW notes, at the outset, that Constellation correctly observes that the proposed obligation of MSS Above 1 GHz systems to show that they do not cause "unacceptable interference" to RAS systems (i.e., by demonstrating compliance with Proposed Section 25.213) necessarily implies the participation by both RAS operators and affected MSS systems

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101/ Id.

102/ See id. at 3-4.

103/ See id. at 6.

in a coordination process.[104/] Coordination between MSS and RAS users that will share portions of the 1610-1626.5 MHz band, or well-defined and objective limits that are reasonable, non-arbitrary surrogates for coordination, are required.

As TRW noted in its Comments, the Committee recommended an out-of-band emission limit that was intended to protect RAS observations at 1610.6-1613.8 MHz from MSS operations above 1613.8 MHz and below 1610.6 MHz.[105/] TRW would not object to the adoption of such a restricted out-of-band emission limit as a surrogate for inter-system coordination -- i.e., if an MSS MES complies with the out-of-band emission limit, no further coordination would be required on this point.

TRW strongly opposes, however, the CORF proposals to impose protection zone requirements in bands above 1613.8 MHz. This change would effectively relegate MSS to co-primary or even lower status in frequency bands that

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104/ See Constellation Comments at 44-45 (citing Proposed Section 25.143(b)(2)(iv)).

105/ See TRW Comments at 123-24 & n.201. TRW presented a case for restating the emission limit proposed by the Committee in terms of dB(W/m²/MHz), as opposed to dB(W/m²/Hz), and noted that such a restated limit would actually inure to the benefit of the RAS community as well. Id. at 124. If such a rule is adopted, TRW proposes the following text:

> Mobile-satellite service mobile earth stations transmitting in the 1613.8-1626.5 MHz band shall limit out-of-band emissions so as not to exceed - 178 dB(W/m^2/1MHz) during observations at the facilities listed in paragraph (a)(1)(i) of this section and - 138 dB (W/m^2/1MHz) during the observations at the facilities listed in paragraph (a)(1)(ii) of this section.

are not allocated at all to RAS.[106/] CORF's proposals are completely unacceptable, and must be rejected. In short, TRW recommends that the Commission adopt Sections 25.213(a)(1)(i)-(iii) as originally proposed in its NPRM.

2. To Minimize The Disruptions To MSS That The Protection Of Co-Primary RAS Operations Entails, The Commission Should Reject CORF's Suggested Modification Of Proposed Section 25.213(a)(1)(v).

TRW also opposes CORF's suggested change to Proposed Section 25.213(a)(1)(v). In its Comments, CORF seeks to relax its obligation under this rule by allowing the Electromagnetic Spectrum Management Unit of the National Science Foundation ("ESMU") merely to provide MSS Above 1 GHz operators with schedules of RAS observations, rather than notifying them of periods of actual radio astronomy observations.[107/]

Contrary to CORF's protests, the obligation to notify a handful of MSS operators of periods of RAS observations is not unduly burdensome. It is far more efficient than a procedure that requires MSS space station licensees to monitor the observation periods of all protected RAS sites on a daily basis in order to see if they

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106/ TRW notes as well that CORF provides no technical substantiation for the size of the zones or extent of the bandwidth that would be affected above 1613.8 MHz.

107/ See CORF Comments at 4-5.

may have changed.[108/] Furthermore, schedules have a way of changing. Any reduction of unnecessary burdens on MSS Above 1 GHz system operators will increase the efficiency of these systems, and help ensure the success of the service. Proposed Section 25.213(a)(1)(v) should therefore remain unchanged.

3. Motorola's Proposed Modification Of Section 25.213(a)(2) Is Self-Serving And Inconsiderate Of The RAS Community's Needs.

TRW urges the Commission to reject Motorola's attempt to remove the out-of-band emission limits that the Commission's proposed rules would place on its proposed secondary downlinks in the 1613.8-1626.5 MHz band in order to protect RAS observations. Motorola seeks to weaken the Commission's Proposed Section 25.213(a)(2) by eliminating all reference to specific protection limits, proposing instead that it be permitted merely "to avoid harmful interference" to RAS sites.[109/]

If the Commission were to adopt Ellipsat's proposal to specify by rule that MSS secondary downlinks are limited to the 1621.35-1626.5 MHz segment (at a

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108/ TRW also asks the Commission to clarify that MSS Above 1 GHz providers employing the beacon systems permitted by § 25.213(a)(1)(vi) need not restrict MES transmissions according to an established schedule of RAS observations, as RAS site beacons will cause such transmissions to be inhibited when actual RAS observations are underway. TRW proposes that this rule be redesignated as § 25.213(a)(2) to assist in this clarification.

109/ See Motorola Comments at 54-55.

maximum), then TRW could see the benefits of a grant of Motorola's proposal -- albeit with a corresponding revision to the lower limit of Motorola's proposed rule (see Motorola Comments at 55). Without a 7.5 MHz guardband between the RAS and Motorola's downlink, Motorola's suggested revision should not be made.[110/] The Commission should require that Motorola live up to the agreement reached by the Committee.

B. AERONAUTICAL RADIONAVIGATION SERVICE AND RADIONAVIGATION SATELLITE SERVICE

As detailed in Section II, the only sensible solution to spectrum "sharing" between the aeronautical radionavigation services ("ARNS") and the MSS Above 1 GHz service in the frequencies between 1610 and 1616 MHz is for the Russian GLONASS system to be reconfigured so that only frequencies well below 1610 MHz are used. In the event that this step occurs, any need for MSS protection of GPS and GLONASS receivers operating in the bands below 1606 MHz can be accomplished by relatively modest out-of-band emission restrictions, such as those proposed by LQP.[111/]

110/ As noted elsewhere, several commenters already are concerned about the Commission's proposal to allow Motorola to expand its secondary downlinks below 1621.35 MHz.

111/ See LQP Comments at 65-66.

1. In-Band Sharing Criteria

With respect to LQP's suggestions concerning the Commission's proposals for in-band interservice sharing, TRW agrees with the modifications that LQP has proposed.[112/] However, because the MSS Above 1 GHz service is inherently global, and applicants will indeed be required to demonstrate global coverage capability, any unilateral steps taken by the United States will neither resolve the conditions upon MSS access to these bands outside the United States, nor provide certainty for the applicants as they seek funding for their systems.[113/]

Under these circumstances, TRW believes that it is both prudent and appropriate to make clear U.S. intentions with respect to the MSS/RDSS bands by adopting immediately regulations applicable to the 1610-1626.5 MHz band that avoid unnecessary protection of the ARNS systems. The Russian Federation and other supporters of the GLONASS system should be made aware that it is U.S. policy to support the development of the global navigation system, but at frequencies that do not inhibit introduction of global MSS. Moreover, it is equally important to emphasize that, for U.S. purposes, it is the integrity of the overall global navigation system that

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112/ See id. at 69-70.

113/ Cf. LQP Comments at 69. It is for this reason that an interim sharing solution must be adopted to foster expeditious implementation of MSS Above 1 GHz service, while at the same time accounting for the fact that the full L-band allocation will not be available to provide service until GLONASS is completely removed from these bands. See FAA Comments at 2; Rockwell Comments at 3.

must be protected and that any transient interference that might be caused to GLONASS facilities within this country are not harmful to the extent that system redundancies made possible by the concurrent use of GLONASS and GPS preserve the accuracy of the overall system.[114/]

For these reasons, rules should be adopted in this proceeding that provide protection to GLONASS only to the extent necessary for the global navigation system to operate successfully in this country with GLONASS moved to frequencies below 1606 MHz.[115/] To conform with this necessary change, the Commission should also modify Proposed Section 25.213(c) by limiting this regulation to the first sentence of the currently proposed rule.[116/] The United States should pursue an accommodation with the Russian Federation that would expedite the relocation of GLONASS to frequencies below 1606 MHz at the earliest possible date, and would

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114/ See LQP Comments at 71 ("[N]either the aviation community nor the Russian Federation has demonstrated that corruption of a single GLONASS measurement will cause harmful degradation in the ability to navigate."); see also Constellation Comments at 52.

115/ Specifically, the Commission should adopt the change in the domestic applicability of RR Footnote 731E that LQP proposed in its Petition for Clarification and Partial Reconsideration in ET Docket No. 92-28 to eliminate any appearance that the ARNS may exact a level of protection beyond that provided by the explicit uplink EIRP limits established by this footnote. See LQP Comments at 67-68. With the availability of GPS domestically, there is no need or justification for the arbitrarily high alternative EIRP spectral density limit that ARINC proposes. See ARINC Comments at 3-4.

116/ See LQP Comments at 70-71.

accelerate the planned transition of the GLONASS system to full antipodal operation.[117/]

2. Out-of-Band Emission Limits

As noted above, once the GLONASS system is relocated to bands below 1610 MHz, protection of both GPS and GLONASS can be achieved through modest out-of-band emission limits. LQP's suggested modification of proposed rule 25.213(b) appears likely to be sufficient to protect GPS, and therefore to ensure the integrity of the global navigation system as a whole.[118/] As previously noted, it is only necessary to protect GLONASS as a part of the global navigation system, not as a stand-alone system.[119/] Any momentary interference with one satellite in the global navigation system will not affect the overall system's accuracy, or reliability.

Moreover, there is no need for any change in the unit of measurement used to define limits on out-of-band emissions from MES, as proposed by the FAA.

117/ See FAA Comments at 2 (supporting the need for a transitional spectrum allocation until GLONASS shifts to full antipodal operation).

118/ TRW noted in its initial comments that measurement programs are currently ongoing to determine the actual interference susceptibility of the global navigation receivers to MSS interference. TRW believes that these tests will demonstrate that prior assumptions concerning the sensitivity of GPS receivers to interference were unduly pessimistic. See Attachment A, TRW Technical Appendix at A-22 to A-23. TRW is confident that these tests will ultimately support a relaxation of the out-of-band emission level at least as significant as that proposed by LQP. Id.

119/ See Attachment A, TRW Technical Appendix at A-21 to A-22; LQP Comments at 71-73.

The spurious emission limitation already articulated in the Commission's Proposed Section 25.213(b) is sufficient to avoid any danger of degradation to GPS transmissions without narrowing the unit of measurement.[120/]

C. TERRESTRIAL FIXED SERVICES IN THE 2483.5-2500 MHz BAND

All parties expressing a viewpoint concerning the potential for MSS interference to terrestrial S-band users concur that the treatment of the PFD level expressed in ITU Radio Regulation 2566 as a coordination trigger is more than sufficient to protect terrestrial users from interference.[121/] Indeed, it is likely that further study will demonstrate that even this value can be relaxed somewhat,[122/] although the degree to which a particular system may be able to operate without interference at higher levels will vary somewhat according to system design. TRW also agrees with LQP that interference assessments should be based on analog terrestrial systems, which are by far the most prevalent.[123/]

120/ See Attachment A, TRW Technical Appendix at A-21.

121/ See TRW Comments at 131; LQP Comments at 77-78.

122/ See Attachment A, TRW Technical Appendix at A-14; LQP Comments at 75-76.

123/ See Attachment A, TRW Technical Appendix at A-14 to A-15; LQP Comments, Technical Appendix thereto at 5 (Section 1.2).

D. INSTRUCTIONAL TELEVISION FIXED SERVICE ABOVE 2.5 GHz

Only a few commenters have addressed the issue of potential interference to MSS Above 1 GHz operations from the Instructional Television Fixed Service ("ITFS") operating above 2500 MHz. Nevertheless, there is significant disagreement among these commenters concerning both the potential impact of out-of-band ITFS interference on MSS operations in the adjacent band and the appropriate means for ameliorating any unacceptable interference of this nature.

Only LQP asserts that interference problems from ITFS transmitters into MSS downlink transmissions are unlikely to be significant. TRW believes, however, that LQP may have taken an overly optimistic view of the interference situation that is colored by assumptions concerning design features peculiar to LQP's own system proposal.[124/]

TRW agrees with LQP, however, that there is no need, indeed no justification, for the creation of a guardband in the upper portion of the 2483.5-2500 MHz band.[125/] Rather, as TRW pointed out in its initial Comments, the appropriate solution to any interference problem that may ultimately be encountered is

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124/ See Attachment A, TRW Technical Appendix at A-23 to A-24.

125/ See LQP Comments at 80.

dictated by the Commission's rules that are already applicable to the ITFS service. Section 74.936(b) of the Commission's Rules provides, in pertinent part, as follows:

> All out-of-band emissions extending beyond these [allocated ITFS] frequencies shall be attenuated at least 60 dB below the peak visual carrier power. *However, should interference occur as a result of emissions outside the assigned channel, additional attenuation may be required.*

47 C.F.R. § 74.936(b) (1993) (emphasis added).

Several commenters from the wireless cable industry ignore these existing obligations, and argue that the obligation to avoid destructive interference should be placed upon the interfered-with MSS operators.[126/] These commenters contend that the MSS Above 1 GHz licensees in the S-band should be required to pay for any modifications to the "first licensed" ITFS stations that are necessary to minimize interference. There is no basis for such a requirement. The "first-in-time, first-in-right" concept that both WCAI and NTCA seek to introduce here is applicable only where users are co-primary in the same band or a new primary service is displacing a previous primary use, and is therefore required to pay the relocation costs for the previous incumbent users.[127/]

126/ See Comments of the Wireless Cable Association International, Inc. ("WCAI") at 3 and 6; Comments of the National Telephone Cooperative Association ("NTCA") at 2-3; Comments of the Corporation for Public Broadcasting ("CPB") at 6.

127/ See, e.g., Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, 7 FCC Rcd 6886 (1992) (emerging technology service providers in reallocated bands required to pay relocation expenses of displaced

(continued...)

By contrast, the potential interference from ITFS transmissions to MSS transmissions would not occur in the same band, but from transmissions in the ITFS band spilling over into the adjacent MSS band. Because ITFS licensees are trespassers -- not "incumbents" -- in the bands below 2.5 GHz, their interference in these bands is not grandfathered to any extent and must be controlled if it causes unacceptable interference to the eventual MSS Above 1 GHz licensees using these frequencies to provide the service for which the bands are allocated on a primary basis.[128/]

It should also be emphasized that ITFS stations are relatively few in number and necessarily involve substantial construction costs -- which will not be

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[127/](...continued)
fixed microwave service incumbents) (cited in NTCA Comments at 3); Amendment of Parts 21, 43, 74, 78 and 94 of the Commission's Rules Governing Use of the Frequencies in the 2.1 and 2.5 GHz Bands Affecting: Private Operational-Fixed Microwave Service, Multipoint Distribution Service, Multichannel Multipoint Distribution Service, Instructional Television Fixed Service, and Cable Television Relay Service, 6 FCC Rcd 6792, 6797 (1991) (requiring initiating party to cover all expenses where "involuntary colocation" of ITFS transmitters is sought to improve spectrum efficiency) (cited in WCAI Comments at 6-7 & n.11).

[128/] Particularly outrageous is the argument advanced by WCAI that the easiest way to avoid interference is simply by withdrawing the allotment of MSS downlinks at 2483.5-2500 MHz. See WCAI Comments at 6. WCAI contends that the alleged ability of the Motorola's non-sharing system to operate bi-directionally in the L-band removes the need for the S-band allotment, despite the fact that this step would squander spectrum and preclude the licensing of more than one of the MSS Above 1 GHz system applicants. The apparent suggestion that monopoly service is sufficient is rather curious coming from the trade association for an industry that exists in no small measure due to the Commission's understandable desire to provide competition for existing cable television monopolies.

unduly increased by the need to make design changes. For these reasons, it is far more prudent to place the burden of ameliorating any destructive interference on these spectrum users. Not only does it make more sense to make changes in construction design for a small number of fixed stations, but it will be much easier to incorporate design changes into such stations than to require MSS system operators to bear the entire burden of ITFS's out-of-band emissions through alterations to the design of MSS handsets -- which, as consumer devices, will have far more significant size, weight and cost constraints in order to support low-cost, universally available services.[129/]

One additional cause for concern raised in WCAI's comments is its assertion that MSS users of the 2483.5-2500 MHz bands will need to consider "an additional potential source of interference," namely, broadband repeaters that are apparently being used by some ITFS and wireless cable system operators to relay signals into areas that would otherwise be unreachable.[130/] TRW questions why the use of these repeaters is just now being raised as an "additional" potential source of interference, particularly in light of WCAI's representation that it participated "actively" in the negotiated rulemaking process.[131/] Regardless, however, of

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129/ See Attachment A, TRW Technical Appendix at A-24 to A-25.

130/ See WCAI Comments at 4.

131/ Id. at 2 and 4. See Attachment A, TRW Technical Appendix at A-25.

whether the potential for interference from these devices should have been made known previously, it remains the responsibility of the users of the ITFS frequencies to ameliorate any destructive interference resulting from their use, as discussed above.

TRW does not prejudge whether unacceptable interference will actually occur from ITFS/wireless cable operations above 2.5 GHz. A prediction of how much interference is likely cannot be made definitively until each CDMA MSS applicant that may operate in these bands finalizes its system design in response to the adoption of final rules in this proceeding. Nevertheless, in view of the fact that MSS downlinks will soon be utilizing this allocated spectrum, TRW continues to believe that now is the prudent time to begin requiring ITFS operators to comply with the out-of-band emission constraints applicable to their systems by employing more sophisticated filtering.[132/] Such an approach is to the benefit of ITFS licensees, which will have a longer transition period in which to make required technical changes.

In the end, however, the Commission has already placed the onus on the ITFS service. In no way should the existence of ITFS's burden be allowed to delay the licensing of MSS Above 1 GHz systems in the primary MSS allocation at 2483.5-2500 MHz, or adversely impact the licensee's ability to bring their systems to market.

132/ See TRW Comments at 132.

E. INDUSTRIAL, SCIENTIFIC AND MEDICAL ("ISM") EMISSIONS

Other than TRW, only two commenters have addressed the issue of interference to MSS in the S-band from industrial, scientific and medical ("ISM") devices, and only one, WCAI, suggests that such interference would be an impediment to development of MSS in the allocated frequencies.[133/] In advancing this conclusion, moreover, WCAI relies solely on initial pessimistic assumptions made during the course of last year's negotiated rulemaking, and asserts that the ability of MSS Above 1 GHz systems to operate successfully in these bands remains in doubt.[134/] The self-evident purpose of this stance is to deflect attention from the more serious interference problems that wireless cable systems using ITFS frequencies may cause in the MSS bands below 2.5 GHz.

In fact, however, destructive ISM interference to MSS transmissions in these frequencies is not so likely as once assumed. TRW and other MSS Above 1 GHz proponents have continued to conduct studies of the issue of ISM interference, and have determined that these emissions are not nearly as troublesome as was initially feared. LQP, for example, described in its initial Comments extensive analyses and field testing with respect to this issue.[135/] LQP concludes, based upon these

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133/ See WCAI Comments at 2-3.

134/ Id.

135/ See LQP Comments at 81-83.

studies, "that ISM transmissions are extremely unlikely to impair receipt of MSS signals . . ."[136/]

Indeed, TRW has conducted its own extensive field tests in a wide variety of locations and conditions in and around Los Angeles between the hours 10 a.m. and 9 p.m. The test methods are described in the Technical Appendix attached hereto.[137/] TRW performed test measurements in a wide variety of locations throughout the Los Angeles area, including suburban residential, industrial, medical, airport, and high-density urban areas. The tests showed that MSS can be provided without serious interference from ISM in nearly all exterior locations tested. One factor for coexistence is that instruments which operate inside buildings are shielded by walls of buildings. Because nearly all users will be operating near ground level, there is a high degree of horizontal attenuation produced by adjacent structures.

Although occasional bit errors were observed during tests in "urban canyon" areas, these errors were transient in nature and would likely be compensated for by Odyssey error correction and voice encoding design features.[138/] Even in the urban canyons where interference was most often encountered, it is likely that additional testing will lead to ways to enhance error correction and improve voice

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136/ Id. at 82-83 (emphasis added).

137/ See Attachment A, TRW Technical Appendix at A-23 and Attachment 1, A-28 to A-29.

138/ See Attachment A, TRW Technical Appendix, Attachment 1 at A-29.

encoding design. In any event, in urban areas, the dual mode feature of Odyssey handsets would permit users to communicate through the terrestrial cellular network in the region and avoid any impairment of communication service. The results of TRW's tests therefore largely corroborate the conclusions reached by LQP that difficulties related to ISM transmissions in the S-band MSS frequencies will be minimal.

Finally, to the extent that use of these bands by microwave ovens and other ISM devices may interfere with MSS transmissions, this phenomenon is more likely to occur at the lower end of the 2483.5-2500 MHz band, nearer the focus center frequency for these devices, 2450 MHz.[139/] Thus, even to the extent that ISM interference does occur in these bands, it is likely to require transmissions to be shifted upward -- thereby magnifying the importance of controlling out-of-band emissions from ITFS stations above 2.5 GHz.

The test results obtained by both TRW and LQP are thus very encouraging, and clearly permit the immediate licensing of MSS Above 1 GHz systems. However, neither the results nor the licensing of systems should dissuade the Commission from taking additional steps to improve the emission performance of ISM devices manufactured in or brought into the United States. As TRW indicated in

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139/ See LQP Comments at 82 and Technical Appendix thereto at 29-31 (Sections 2.3.3.3 and 2.3.3.4).

its initial Comments, the current ISM interference situation poses no threat to the implementation of MSS service using the 2483.5-2500 MHz band; however, it is still highly advisable for the Commission to take affirmative steps to ensure that no changes to ISM equipment are permitted that might increase the potential for interference, and that more stringent emission limits for ISM be considered for equipment manufactured in the future. To this end, TRW has proposed a Commission inquiry directed toward establishing more definitive guidelines in this area, which would maximize the utility of these bands for mobile communication without unduly restricting the current uses.[140/]

IV. THE COMMISSION SHOULD MAKE FEEDER LINK ASSIGNMENTS AT KA-BAND TO ALL APPLICANTS WHO SEEK SUCH ASSIGNMENTS.

Not many commenters were taken with the Commission's proposal to require all five applicants for non-geostationary MSS Above 1 GHz systems to locate the feeder links for their proposed systems in the Ka-band frequencies at 27.5-30.0 GHz and 17.7-20.2 GHz. See NPRM, 9 FCC Rcd at 1131 (¶ 77). The three applicants that had applied for authority to establish feeder links in much lower frequency bands all balked at the cost and design ramifications of relocating their

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140/ See TRW Comments at 133-34.

feeder links to the Ka-bands.[141/] Other applicants for satellite systems in the Ka-bands also opposed the Commission's proposal. See Comments of Teledesic Corporation.

The two MSS Above 1 GHz applicants that have proposed to establish feeder links at Ka-band -- TRW and Motorola -- expressed both their support for the assignment of feeder link spectrum, and their concern about the encroachment on what had previously been fallow spectrum by a land rush of more recent terrestrial and satellite applicants.[142/] Indeed, Motorola appears headed toward the conclusion that with the increasing congestion that has emerged in the Ka-bands, band segmentation may be the only feasible method of sharing the Ka-band frequencies among MSS feeder links, geostationary satellites, and point-to-multipoint terrestrial systems.[143/]

TRW agrees with Motorola that coordination of MSS Above 1 GHz feeder links and geostationary Fixed-Satellite Service ("FSS") systems through the use

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141/ See, e.g., Ellipsat Comments at 24-25; Constellation Comments at 57-59; LQP Comments at 94-96. TRW understands the reluctance of these applicants to redesign their systems to specify Ka-band feeder links. It is of the view that the negative comments some of these applicants have made about the utility and efficiency of Ka-band frequencies is applicable only to the type of system these applicants have designed. Such criticisms are not, in TRW's view, applicable to the system TRW has designed -- a design that is intended to accommodate feeder links at Ka-band.

142/ See TRW Comments at 139-141; Motorola Comments at 57-58.

143/ Motorola Comments at 58.

of geographic protection areas will be made impractical if FSS systems are permitted to use the Ka-bands to serve numerous small earth station owners.[144/] TRW believes, however, that if the Commission does not let the bands -- which were nearly pristine at the time TRW filed its application in May 1991 -- become too congested with new FSS and terrestrial services, it may still be possible for MSS Above 1 GHz systems to share Ka-band spectrum with services other than MSS Above 1 GHz system feeder links. In other words, TRW would need an exclusive allocation of spectrum vis-a-vis other MSS Above 1 GHz system feeder link users (namely Motorola, which already proposes different Ka-band frequencies than the ones TRW seeks), but may be able to share with geostationary FSS systems.[145/]

In any event, TRW urges the Commission to follow through on its commitment to license MSS Above 1 GHz systems -- at least those that so desire -- to place their feeder links at Ka-band frequencies. This assignment should be made without regard to the ongoing LMDS rulemaking proceeding in CC Docket No. 92-297, and without regard to the status of the feeder link allocation efforts of

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144/ At least one of the pending new applications for Ka-band FSS systems -- Hughes Communications Galaxy, Inc. -- proposes such a use. The frequencies sought by Hughes overlap with those bands separately applied for by TRW and Motorola.

145/ TRW's desired feeder link allocation is not in the frequency band proposed for co-allocation to the terrestrial Local Multipoint Distribution Service ("LMDS").

those MSS Above 1 GHz applicants that have eschewed the Ka-bands in favor of potential feeder link allocations in frequency bands below 15 GHz.[146/]

V. SERVICE RULES

A. THERE IS NO SUPPORT FOR APPLYING COMMON CARRIER REGULATION TO THE MSS ABOVE 1 GHz SERVICE

1. There Is No Support For The Imposition Of Common Carrier Regulation On The Provision Of MSS Above 1 GHz Space Segment Capacity To Service Providers.

Not one commenter favors the regulation of the provision of space segment capacity by MSS Above 1 GHz satellite system licensees to service providers or resellers as common carriage.[147/] On the contrary, those commenters addressing the matter agree that the provision of space segment capacity under such circumstances does not meet the seminal definition of common carriage in National Association of Regulatory Utility Commissioners v. FCC.[148/]

146/ In its comments, AMSC makes a number of broad assertions about the availability of feeder link spectrum for MSS Above 1 GHz systems that are inaccurate, inapplicable to TRW's proposed use of medium Earth orbits and feeder link spectrum at 29.5-30.0 GHz and 19.7-20.2 GHz, or both. TRW's specific responses to AMSC's technical contentions are presented in the attached Technical Appendix.

147/ See, e.g., Constellation Comments at 60; Ellipsat Comments at 45-46; LQP Comments at 96-101; Motorola Comments at 61-62; AirTouch Comments at 4-7; TRW Comments at 149-55.

148/ 525 F.2d 630, 642 (D.C. Cir.), cert. denied, 425 U.S. 992 (1976) ("NARUC I").

(continued...)

The commenters also agree that there will be sufficient competition among the MSS Above 1 GHz system licensees to ensure the availability of space segment capacity to all who seek it.[149/] End users will face no threat of unfair or discriminatory treatment at the hands of service providers, as MSS Above 1 GHz service provided directly to end users will typically be regulated as common carriage under the Commission's rules.[150/] In fact, the imposition of common carrier regulation on the provision of space segment capacity to parties other than end users would ultimately harm end users; forcing MSS Above 1 GHz system operators to serve any and all terrestrial carriers who seek capacity would encourage the technically and economically inefficient proliferation of gateways, thereby raising the cost of service unnecessarily.[151/]

148/(...continued)
See, e.g., Constellation Comments at 60; Motorola Comments at 63-64; AirTouch Comments at 8; TRW Comments at 149-55.

149/ See, e.g., Ellipsat Comments at 45-46; Motorola Comments at 63-64; AirTouch Comments at 7; TRW Comments at 150-52.

150/ See LQP Comments at 100. See also Implementation of Sections 3(n) and 332 of the Communications Act; Regulatory Treatment of Mobile Services, 9 FCC Rcd 1411 (1994) (Appendix A, FCC Rule 20.9(a)(10), to be codified at 47 C.F.R. § 20.9(a)(10)) ("Commercial Mobile Services Order") (stating that "[a]ny mobile satellite service involving the provision of commercial mobile radio service (by licensees or resellers) directly to end users . . ." shall be treated as a common carriage service).

151/ See LQP Comments at 100; AirTouch Comments at 5-6.